PATENT SPECIFICATION 803,602

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Date of filing Complete Specification: Aug. 8, 1957.

Application Date: Aug. 16, 1956. No. 25061/56.

Complete Specification Published: Oct. 29, 1958.

Index at Acceptance:—**Class 113, A8F, M.**

International Classification:—**B63b.**

COMPLETE SPECIFICATION.

Improvements in or relating to the Stabilisation of Ships.

We, MUIRHEAD & CO. LIMITED, a Company registered under the laws of Great Britain, of Elmers End, Beckenham, in the County of Kent, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates primarily to the stabilization of ships and refers particularly to the movable fins or hydroplanes used in so-called activated fin systems.

In activated fin stabilizers, fins projecting from the hull of the ship below the water line are moved by power means within the ship to apply torques which oppose the roll. The fins are normally placed on a line which is substantially radial to the axis about which the ship rolls; thus they might be arranged to project from the sides or from the bottom of the ship, but in order to reduce the danger of the fins being fouled by objects coming near to the ship a favourite location is on the curved portion of the hull between the sides and the bottom.

According to one known construction, the fins are retractable and may be withdrawn into fin boxes located within the hull of the ship. The fin boxes are of considerable size and are flooded with water. There projection into the ship uses up valuable space which would otherwise be available for cargo or for other purposes. The fins may, however, be retracted when not in use and the danger of their fouling other vessels, dock structures or similar objects is avoided.

In another known construction the fins are not retractable and they may be located so that they are within the projection of a bilge keel or they may be located on the curved portion of the hull, their projection being limited so as not to extend beyond the angle formed by producing the substantially vertical side and the substantially horizontal bottom of the vessel. In either case the projection of the fin is severely limited and it is usually necessary to use more than one pair of such small fins in order to develope sufficient stabilizing torque.

The invention consists of a fin comprising two or more sections arranged to telescope into each other. In one construction the fin may be arranged so that when telescoped the projection of the fin is within the angle formed by producing the side and the bottom of the ship, and in an alternative construction the telescoped fin is retracted into a fin box within the hull of the ship. It will be readily appreciated that a given size of fin may be accommodated in a much smaller fin box when telescoped.

The telescopic construction has a further advantage in that the fin may be used for stabilizing the ship while in the telescoped condition. Thus when the vessel is proceeding at high speed the fin might be used in the telescoped condition, whereas when the vessel is proceeding at low speed the fin might be extended to present the maximum effective area.

The invention will now be further described in conjunction with the drawings accompanying the Provisional Specification in which:—

Figure 1 shows the incorporation of a fin according to the invention in the ship's structure.

Figure 2 shows an end view of the fin of Figure 1.

Figure 3 shows a section of a fin adapted to be extended and telescoped by mechanical means.

Figure 4 shows a similar fin adapted to

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be extended and telescoped by hydraulic means.

In order that the invention may readily be understood only essentials have been shown. Furthermore, in practical constructions some of the parts shown would have to be made in two or three pieces, joined together during assembly. The modifications required are, however, within the purview of persons skilled in the art.

Referring to Figure 1, a portion of the hull 1 of a ship carries a support 2 for a fin shaft 3. Fin shaft 3 carries the major portion 4 of a fin which has a second portion 5. Portion 5 of the fin can be telescoped into portion 4.

The location of the fin and fin shaft is such that the fin projects into the angle formed by producing the substantially vertical side of the ship downwards (dotted line 6) and producing the substantially horizontal bottom of the ship sideways (dotted line 7). When portion 5 is telescoped into major portion 4 the whole fin is within the angle bounded by lines 6 and 7.

Figure 2 shows, on a larger scale, a view of the fin 4, 5 when looking in the direction of arrow A of Figure 1. Telescoping portion 5 of the fin is of the same form as major portion 4 but is smaller in dimension to enable it to fit inside portion 4. The dotted circle represents the fin shaft 3, whilst the chain lines 8 represent the limits of movement of the centre line of the fin when it is being oscillated for the purpose of stabilizing the ship against roll.

Figure 3 shows the construction of a fin according to the invention having mechanical means for extending and telescoping the moving portion and also means for withdrawing the whole fin into a fin box.

A fin box 9 is attached to the hull 10 of the ship by suitable means. A slide 11 is arranged for longitudinal movement within the fin box (i.e., from right to left in the Figure) and may be moved, for example, by the engagement of mechanism (not shown) in the groove 12 on the inner end of slide 11. Slide 11 is also supported by an inboard bearing 13 in the fin box and ingress of water is prevented by a gland 14.

Slide 11 forms a bearing for fin shaft 15 which carries the major portion 16 of the fin. The inner end of fin shaft 15 carries a lever 17 having cross bore 18 which may be engaged by mechanism (not shown) coupled to the fin engine for the purpose of oscillating the fin about its axis. The telescoping portion 19 of the fin is supported in major portion 16. A screw 20 is secured to telescoping portion 19 of the fin and is engaged by a threaded sleeve 21 which terminates in a shaft 22. Shaft 22 may be rotated, for example, by a gear wheel (not shown) meshing with pinion 23.

When sleeve 21 is rotated screw 20 is constrained to move axially and telescoping portion 19 of the fin is either extended or retracted according to the direction of rotation of shaft 22.

With the fin in the extended position shown the full areas of the major portion 16 and the telescoping portion 19 are effective for stabilizing the ship. Where the full stabilizing force is not required portion 19 may be telescoped into major portion 16 by means of shaft 22 when major portion 16 alone is effective. It will be understood that any necessary change would be made in the characteristics of the control apparatus to secure that it operates correctly with the smaller effective fin area. When it is required to withdrawn the complete fin into the ship, slide 11 is operated by the mechanism engaging groove 12. It is to be understood that mechanical couplings to lever 18 and pinion 23 are so arranged as to allow the whole fin mechanism to slide the required distance to retract major portion 16 into fin box 9.

Figure 4 shows a telescoping fin according to the invention arranged for hydraulic extension and telescoping. Fin shaft 24 carries the major portion 25 of a fin. A telescoping portion 26 is supported by major portion 25. A ball socket 27 is attached to the outer end of telescoping portion 26 and accommodates a ball on the end of a shaft 28. The inner end of shaft 28 carries a piston 29 operating in a hydraulic cylinder 30. Two ducts 31 and 32 lead into the two ends of cylinder 30. The inner portion 25 of the fin carries a bearing 33 for shaft 28 and a gland 34 may be incorporated in bearing 33. When the hydraulic fluid is forced into cylinder 30, through duct 32, piston 29 is moved to extend the telescoping portion 26 of the fin into the position shown in the Figure. The hydraulic pressure is maintained all the time the fin is extended to hold portion 26 firmly in position. On the other hand, when the hydraulic pressure is applied to duct 31, piston 29 is constrained to move in the opposite direction to telescope portion 26 into major portion 25.

In place of the double-acting hydraulic cylinder shown a single-acting cylinder might be employed, if desired, in which case only duct 32 would be required, the opposite end of the hydraulic cylinder being vented to atmosphere. With such an arrangement hydraulic fluid is admitted to duct 32 to extend to telescoping portion 26 of the fin and it will be understood that the pressure is to be maintained to keep the fin in the extended position. When it is desired to telescope portion 26 into major portion 25 the hydraulic pressure is released and the pressure of the sea acts upon the portion 26 to telescope it into major portion 25. This

action may be assisted, if necessary, by applying suction to duct 32 in order to reduce the pressure in cylinder 30. In a variation of this method the hydraulic cylinder is replaced by an extensible container similar in form to a bellows, suitably attached and located within the fin, thus avoiding the use of a gland at the telescoping joint.

It is to be understood that the embodiments described are only exemplary and many other constructions are possible within the scope of the invention. For example, inclined or interlocking facings or fittings pins may be provided at the mating faces of the relatively moving portions of the fin so that they are rigidly held together when in the extended position. Slides, keyways, splines or the like may also be provided to ensure that the relatively moving parts of the fin move easily with relation to each other and maintain their alignment whilst extending or telescoping. It is also to be understood that instead of only one telescoping portion, as shown in the Figures, fins may be constructed with two or more portions which telescope into each other and into the major portion.

The invention may also be applied to the articulated type of fin consisting of a main body attached to the fin shaft and a secondary or flap portion hinged to the main body and adapted to tilt to a greater angle than the main body.

It will be obvious that the construction described may also be applied to fins used for stabilization of ships against pitch or to hydroplanes used for purposes other than stabilization.

WHAT WE CLAIM IS:—

1. A fin or hydroplane for a ship comprising a hollow major portion, means to support the major portion for partial rotation about an axis at right-angles to the direction of travel of the ship, at least one telescoping portion adapted to be retracted into the major portion, and means to extend and retract each telescoping portion.

2. A fin or hydroplane, as claimed in Claim 1, comprising a fin box to accommodate the major portion, means to support the major portion for sliding movement out of and into the fin box, and means to extend and retract the major portion out of and into the fin box.

3. A fin or hydroplane, as claimed in Claim 1 or 2, comprising a screw and nut arranged so that rotation of the nut in one direction or the other with respect to the screw extends or retracts the telescoping portion.

4. A fin or hydroplane, as claimed in Claim 1 or 2, comprising a hydraulic piston and cylinder arranged to extend and retract the telescoping portion.

5. A fin or hydroplane, as claimed in any preceding claim, comprising interlocking parts on the major portion and each telescoping portion, the parts being arranged to interlock when each telescoping portion is fully extended.

6. A fin or hydroplane for stabilization of ships substantially as described and shown in Figure 1 of the drawings accompanying the Provisional Specification.

7. A fin or hydroplane substantially as described and shown in Figure 3 of the drawings accompanying the Provisional Specification.

8. A fin or hydroplane substantially as described and shown in Figure 4 of the drawings accompanying the Provisional Specification.

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PROVISIONAL SPECIFICATION.

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which would otherwise be available for cargo or for other purposes. The fins may, however, be retracted when not in use and the danger of their fouling other vessels, dock structures or similar objects is avoided.

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The invention will now be further described in conjunction with the accompanying drawings in which:—

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Figure 2 shows an end view of the fin of Figure 1.

Figure 3 shows a section of a fin adapted to be extended and telescoped by mechanical means.

Figure 4 shows a similar fin adapted to be extended and telescoped by hydraulic means.

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Abingdon: Printed for Her Majesty's Stationery Office, by Burgess & Son (Abingdon), Ltd.—1958.
Published at The Patent Office, 25, Southampton Buildings, London, W.C.2,
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803,602 PROVISIONAL SPECIFICATION
1 SHEET
This drawing is a reproduction of the Original on a reduced scale.

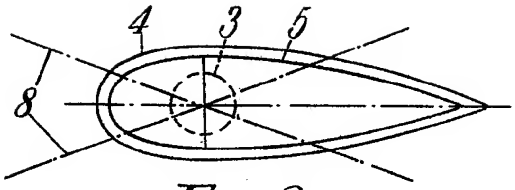

Fig. 2.

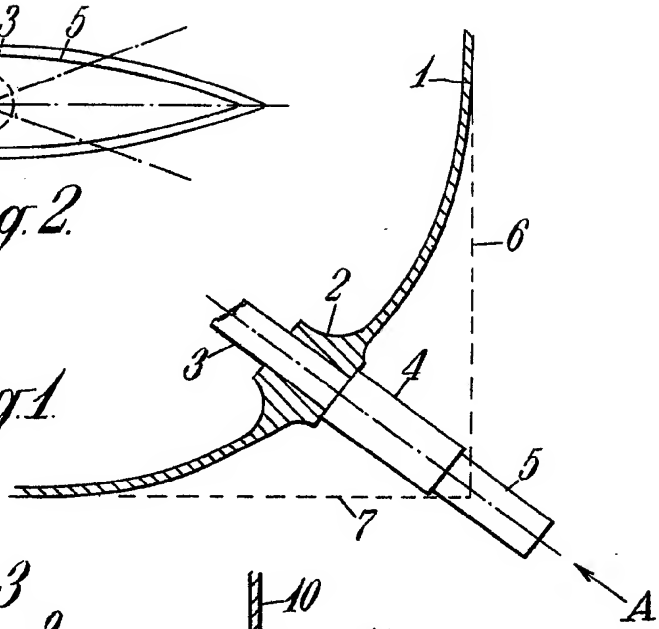

Fig. 1.

Fig. 3

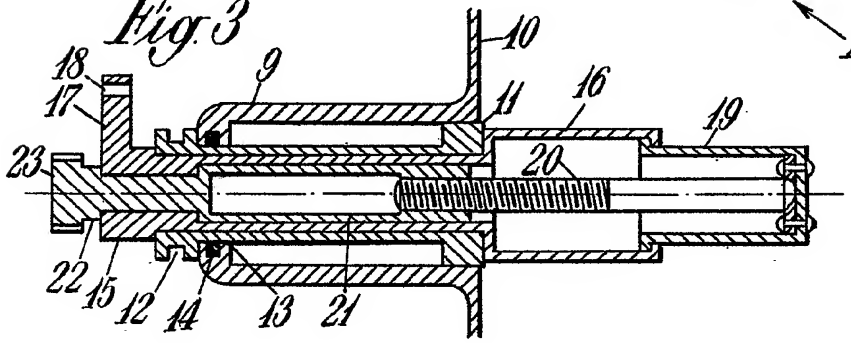

Fig. 4